

**PRODUCT MANUAL FOR  
COLD REDUCED CARBON STEEL SHEET AND STRIP  
PART 2 HIGH TENSILE AND MULTI-PHASE STEEL  
According to IS 513(Pt.2):2016**

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	<b>Product</b>	:	<b>IS 513 (Part 2):2016</b>
	<b>Title</b>	:	Cold Reduced Carbon Steel Sheet and Strip Part 2 High Tensile and Multi-Phase Steel
	<b>No. of amendments</b>	:	0
2.	<b>Sampling Guidelines</b>		
a)	<b>Raw material</b>	:	No specific requirement in case of steel producers manufacturing CR sheets from billets/blooms/ingots. Re-rollers carrying out only cold rolling uses HR coils conforming to IS 11513:2017
b)	<b>Grouping Guidelines</b>	:	Please refer Annex - A
c)	<b>Sample Size</b>	:	For mechanical tests: 2 No.s of 0.5mX0.5m For chemical tests: 5 pieces of 5 cm X 5 cm or 50 g drillings
3.	<b>List of Test Equipment</b>	:	Please refer Annex - B
4.	<b>Scheme of Inspection and Testing</b>	:	Please refer Annex - C
5.	<b>Possible tests in a day</b>	:	All tests
6.	<b>Scope of the Licence :</b>		
	Licence is granted to use Standard Mark as per IS 513(Pt.2):2016 with the following scope:		
	<b>Name of the product</b>	Cold Reduced Carbon Steel Sheet and Strip Part 2 High Tensile and Multi-Phase Steel	
	<b>Grade</b>	ISC590LA, ...	
	<b>Surface Finish</b>	Dull Finish (C) etc.....	
	<b>Thickness, Width, Length(sheets)</b>	<b>Thickness:</b> from ...mm to...mm, <b>Width:</b> From ..... mm to .... mm, <b>Length:</b> from ....m to .....m.	

**ANNEXURE A**  
**TO PRODUCT MANUAL FOR**  
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**GROUPING GUIDELINES**

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1. Grouping has been done on the basis of Designation (quality) as under:

Group	Designation(Quality)	Grade	No of sample
1	High Strength Low Alloy	ISC310LA, ISC320LA ISC350LA, ISC380LA ISC410LA, ISC440LA ISC470L, ISC510LA ISC550L, ISC590LA ISC600LA, ISC700LA ISC860LA	i) One sample of any size of any Grade may be drawn. If sample of higher minimum tensile strength is tested then the recommendation may include grades of lower minimum tensile strength also.
2	C, Mn Steel	ISC490W,ISC540W ISC590W	i) One sample of any size of any Grade may be drawn. If sample of higher minimum tensile strength is tested then the recommendation may include grades of lower minimum tensile strength also.  ii) For example, Sample of ISC590W should be drawn to cover ISC490W to ISC590W.
3	Dual Phase steel	ISC450Y ,ISC490Y ISC540Y ,ISC590YL ISC590Y, ISC780Y,ISC980YL ,ISC980Y ,ISC1180Y ISC1180YL	i) One sample of any size of any Grade may be drawn. If sample of higher minimum tensile strength is tested then the recommendation may include grades of lower minimum tensile strength also.  ii) For example, sample of any of the grades ISC1180YL should be drawn to cover ISC450Yto ISC1180YL.
4	Dual Phase steel	ISC590YH ,ISC780YH ISC980YH,ISC1180YH	i) One sample of any size of any Grade may be drawn. If sample of higher minimum tensile strength is tested then the recommendation may include grades of lower minimum tensile strength also.  ii) For example, sample of any of the grades ISC1180YH should be drawn to cover ISC590YHto ISC1180YH.
5	TRIP Steel	ISC590T,ISC690T, ISC780T	i) One sample of any size of any Grade may be drawn. If sample of higher minimum tensile strength is tested then the recommendation may include grades of lower minimum tensile strength also.  ii) For example, Sample of ISC780T should be drawn to cover ISC590T to ISC780T.

6	Complex Phase Steel	ISC600C,ISC780C,ISC980C	<p>i) One sample of any size of any Grade may be drawn. If sample of higher minimum tensile strength is tested then the recommendation may include grades of lower minimum tensile strength also.</p> <p>ii) For example, Sample of ISC980C should be drawn to cover ISC600C to ISC980C.</p>
7	Martensitic Steel	ISC900M,ISC1100M,ISC1300M, ISC1500M	<p>i) One sample of any size of any Grade may be drawn. If sample higher minimum tensile strength is tested then the recommendation may include grades of lower minimum tensile strength also.</p> <p>ii) For example, Sample of ISC1500M should be drawn to cover ISC1500M to ISC900M.</p>
8	Hot forming grades	ISC480HF	i) One sample of any size may be drawn to cover all sizes in the grade.

2. During preliminary inspection, before drawing samples for independent testing, it shall be ensured by IO that tests for Dimensions and Tolerances as per cl.10 of IS 513(Pt.2):2016 shall be carried out at factory premises on the samples to be drawn for independent testing as it is difficult to transport bulky samples to laboratory. In case of inclusion, factory test report for Dimensions and Tolerances as per cl.10 of IS 513(Pt.2):2016 may be accepted and conformity of the grades included to the same has to be verified during next surveillance visit.
3. The sample tested may be of any of the sizes (see Cl.10) and Surface condition (see Cl.8.4) as mentioned in the specification. It is to be ensured that at least one sample of bright finish is to be drawn/tested in case applicant/licensee has applied for bright finish. If the sample passes, the licence can be granted for all the sizes and surface finishes (cl.8.5) mentioned in the specification and as applied by the applicant/licensee, provided that the firm is having all necessary manufacturing and testing facilities for manufacture and testing of all other sizes and surface finishes of sheets/strips proposed to be included in the licence.
4. During the operation of licence, BO shall ensure that all the grades and sizes of sheets/strips covered in the license are drawn for independent testing on rotation over a period of time.

**ANNEXURE B**  
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**LIST OF TEST EQUIPMENTS**

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Major test equipment required to test as per requirements of Indian Standard.

Sl. No.	Test Equipment/Chemicals and Identification Numbers (Where applicable)	Tests Used in with Clause Reference
1.	<p><b>Instrumental methods</b>  Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry.</p> <p>Spectrophotometer</p>	<p>Chemical Composition Cl 6.a, 6.b, 6.c.</p> <p>Mn, S, P, Si</p>
2.	<p>Strohlein or Leco apparatus with all attachments  Barometer with chart, Hot plate, Muffle furnace, Complete range of glass wares, measuring cylinders, Desiccator, porcelain boats or ceramic crucibles, Thermometer, Electronic Balance, Distilled Water, Hot air oven, Oxygen - 99.5 percent minimum purity, ether or acetone, Standard Reference Material (NML) with certificate</p> <p>Reagents for C: tin granules or pure iron fillings, acidulated water/brine water, methyl red, caustic potash</p> <p>Reagents for S: Ceramic boats/crucibles – desiccators, Fluxes -Low sulphur copper, tin or iron, Dilute hydrochloric acid, Starch Iodide solution, Potassium iodate</p>	<p>Cl 6.a, 6.b, 6.c - C &amp; S  (chemical method, alternative to instrumental method)</p>
3.	<p>Weighing balance, Heater/ Heating element along with energy regulator, Ice water bath, Vol Flask Cap – 1 litre, (Whatman) filter paper No. 040, Suction Filtration Facility, Filter paper pulp pad, Standard Reference Material (NML) with certificate</p> <p>Potassium Permanganate (KMnO<sub>4</sub>), Sodium Nitrite (NaNO<sub>2</sub>), Ammonium Molybdate [(NH<sub>4</sub>)<sub>2</sub> Mo<sub>2</sub>O<sub>7</sub>], Ammonium Phosphate [(NH<sub>4</sub>)<sub>3</sub> PO<sub>4</sub>], Potassium Nitrate (K<sub>2</sub>NO<sub>3</sub>), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO<sub>4</sub>), Sulphurous Acid, Hydrobromic Acid (HBr), other chemicals and reagent as applicable</p>	<p>Phosphorus content Cl 6.a, 6.b, 6.c.  (chemical method, alternative to instrumental method)</p>

4.	Hot plate, Conical flask Reagents:  silver nitrate, ammonium persulphate sodium arsenite solution, Dilute Nitric Acid, Phosphoric Acid, Dilute Sulphuric Acid, Concentrated Nitric Acid, NaCl Solution, Permanganic acid	Manganese content Cl 6.a, 6.b, 6.c (chemical method, alternative to instrumental method)
5.	Medium textured filter paper, Porcelain casserole, platinum crucible, filter paper pulp, hot plate, hot air oven, muffle furnace  Reagents: Silver nitrate solution, concentrated nitric acid, concentrated sulphuric acid, Dilute Hydrochloric Acid, Dilute Sulphuric Acid, Perchloric Acid, Tartaric acid and hydrofluoric acid	Silicon content Cl 6.a, 6.b, 6.c (chemical method, alternative to instrumental method)
6.	Determination of Nitrogen by Thermal Conductivity Method/ By Inert gas fusion followed by thermal conductivity detection/ By Steam Distillation Method	Nitrogen Content Cl. 6.a, 6.b, 6.c
7.	UTM (0-500kN)	Tensile Test cl.7.1. Tensile Strain Hardening Component cl.7.3
8.	Steel Mandrels (for bend tests), Templates (for Bend test), UTM attachments/clamps/vice/Magnifying glass	Bend test cl. 7.2
9.	Surface Roughness Tester (in-house Calibration using roughness block)	Surface finish cl. 8.5
10.	i) Cord ii) Vernier Caliper iii) Flat bench iv) Measuring Tape; and v) Micrometer	Dimensions & Tolerances cl. 10

Note: The above is an indicative list for the purpose of guidance only

**ANNEXURE C  
TO PRODUCT MANUAL FOR  
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**SCHEME OF INSPECTION AND TESTING**

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**LABORATORY** - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

**1.1** The manufacturer shall prepare a calibration plan for the test equipments.

**2. TEST RECORDS** – The manufacturer shall maintain test records for the tests carried out to establish conformity.

**3. LABELLING & MARKING –**

The Standard Mark as given in the Schedule of the license and Licence Number (i.e. CM/L.....) shall be incorporated, and the marking shall be done as per the provisions of the Indian Standard, provided always that the product thus marked conforms to all the requirement of the specification. In addition, details of BIS website shall be marked as follows: “For details of BIS certification please visit [www.bis.gov.in](http://www.bis.gov.in)”

**4. CONTROL UNIT** – For the purpose of this scheme, 50 tonnes of material or part there of representing the same cast, grade quality, rolled to same thickness & processed in identical conditions and heat-treatment (if any), shall constitute a control unit.

**5. LEVELS OF CONTROL** - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

5.1 All the production which conforms to the Indian Standards and covered by the licence should be marked with Standard Mark.

**6. TEST CERTIFICATE**-For each consignment of BIS Certified material conforming to IS 513(Pt.2):2016 there shall be a test certificate which shall contain the Standard Mark, the cast/Control Unit number and the corresponding test results (as given in Annexure-I enclosed)

**7. REJECTIONS** – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016. Any rejected material which is potentially re-salable be sheared or cut or deformed in such a manner that it cannot be used for any other purpose except re-melting. A separate record shall be maintained giving information on quantity and cast number/coil number/control unit number, as applicable, relating to all such rejections/defective/sub-standard material of the production not conforming to the requirements of the Specification and the method of its disposal. Such material shall in no case be stored together with that conforming to the Specification. The Standard Mark (if already applied) on rejected material should be defaced.

**ANNEXURE C**  
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**SCHEME OF INSPECTION AND TESTING**

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**TABLE 1: LEVELS OF CONTROL**

(1)		(2)	(3)		(4)		
TEST DETAILS			LEVELS OF CONTROL		REMARKS		
Clause	Requirements	Test Method	Test equipment requirement R: required (or) S: Sub-contracting permitted	No. of Samples		Frequency	
		Clause	Reference				
6	Chemical Composition						
	Ladle Analysis	6.a ,6.b Table 2	IS 513(Pt.2): 2016 & IS 228	R	One	Each Cast	Applicable for primary steel producers only
	Product Analysis	6.c, Table 3	(Various Parts) / any established Chemical/ Instr. Method. Alternatively, method specified in relevant ISO standard may also be used.	R	i) Nil  ii)One	i)Nil  ii) Each Cast	i) Applicable for primary steel producers with steel making and rolling facilities, wherever traceability to the heat is ensured by manufacturer.  ii)Applicable for manufacturers feeding to rolling mills(see Note-3)
7.1	Tensile Test	7.1.1, 7.1.2,7.1.3 , & 7.1.4 , 7.4 Table 4A,4B	IS 513(part 2):2016  IS 1608	R	One (from every 50 tonne or less)	Each Control Unit	To be carried out only if specified by the purchaser
7.2	Bend Test	7.2.1, 7.2.2, 7.2.3 & 7.2.4, 7.4 Table 5	IS 513(part2): 2016  IS 1599	R	-do-	-do-	Can be applied with mutual agreement between the manufacturer and the purchaser.

7.3	Tensile strain hardening component	7.3.1, 7.3.2, 7.4, Table 4A	IS 513(part 2):2016 IS 15756	R	One (from every 50 tonne or less)	Each Control Unit	
8.4	Surface Condition	8.4.1 8.4.2 8.4.3 8.4.4 8.4.5	IS 513(part 2):2016	R	Each Sheet/ strip	Each Sheet/ strip	
8.5	Surface Finish	8.5.1 8.5.2 8.5.3 Table 6	IS 513(part 2):2016  IS 15262	S	As agreed between the purchaser and the supplier.		
9	Freedom from defects	9.1,9.2 & 9.3	IS 513(part 2):2016	R	As agreed between the purchaser and the supplier.		
10	Dimensions & Tolerances	10.1, 10.2 & 10.3	IS 513(part 2):2016  IS/ISO 16162	R	Adequate inspection to ensure each item to be within the limits of specification.		
12	Packing	12.3, 8.6 Table 7	IS 513(part 2):2016	R	Each Sheet/ strip	Each Sheet/ strip	i) Weight of sheets and strips in bundles or packages shall be as agreed to between the purchaser and the manufacturer. ii) Each Sheet/strip shall be treated on both sides with non-hardening type rust preventive oil, which can be easily washed with aqueous alkali solution. iii) The product may not be oiled, only if required by the purchaser.

Note-1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau.

Note-2: The control unit and levels of control as decided by the Bureau are obligatory to which the licensee shall comply with.

Note-3: No testing for product analysis is required if material fed to rolling mills is ISI marked and received with test certificate.





**ANNEXURE I**

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(Para 6 of the Scheme of Inspection and Testing)

XYZ IRON AND STEEL COMPANY

(Registered office Address and works address)

**TEST CERTIFICATE FOR COLD REDUCED CARBON STEEL SHEET AND STRIP  
PART 2 HIGH TENSILE AND MULTI-PHASE STEEL**

TEST CERTIFICATE No. \_\_\_\_\_

DATE \_\_\_\_\_

To M/s \_\_\_\_\_

We certified that the material described below fully conforms to IS 513(Pt.2):2016 Chemical composition and Physical properties of the product, as tested in accordance with the Scheme of Inspection and Testing contained in the BIS Certification Marks Licence No. CM/L \_\_\_\_\_ are as indicated below against each order No.

(PLEASE REFER TO IS 513(Pt.2):2016 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

**TEST RESULTS**

Order No. & Date	(nom Size)	Control Unit No.	Grade	Quantity (in tonnes)	CHEMICAL COMPOSITION							#MECHANICAL PROPERTIES			n	Surface Finish	#Bend test	Condition
					C %	S %	P %	Si %	Mn %	Al %	@ Micro Alloying Elements %	YP	TS	% elongation				

# If required by purchaser

@ Micro-alloying element present should be indicated

REMARKS

WAGON NO.

TRUCK NO.

(It is suggested that size A4 paper be used for this test certificate)

FOR XYZ IRON AND STEEL COMPANY